WEST Search History

Hide Items | Restore | Clear | Cancel

DATE: Friday, February 20, 2004

Hide?	Set Name	Query	Hit Count
		DB=USPT; PLUR=YES; OP=ADJ	
☐	L6	l1 and (liner with (heater or heating))	12
☐	L5	L4 and embedded	8
☐	L4	5709757 and plasma	16
☐	L3	L2 and lamp	17
☐	L2	L1 and (embedded with (heater or heating))	30
☐	L1	438/905.ccls. or 134/1.ccls. or 134/1.1.ccls.	1748

END OF SEARCH HISTORY

WEST Search History

Hide Items | Restore | Clear | Cancel

DATE: Friday, February 20, 2004

Hide?	Set Name	Query	Hit Count
		DB=USPT; PLUR=YES; OP=ADJ	
☐	L5	L4 and embedded	8
☐	L4	5709757 and plasma	16
☐	L3	L2 and lamp	17
☐	L2	L1 and (embedded with (heater or heating))	30
☐	L1	438/905.ccls. or 134/1.ccls. or 134/1.1.ccls.	1748

END OF SEARCH HISTORY

WEST Search History

Hide Items | Restore | Clear | Cancel

DATE: Friday, February 20, 2004

Hide?	**Set Name**	**Query**	**Hit Count**
		DB=USPT; PLUR=YES; OP=ADJ	
☐	L3	L2 and lamp	17
☐	L2	L1 and (embedded with (heater or heating))	30
☐	L1	438/905.ccls. or 134/1.ccls. or 134/1.1.ccls.	1748

END OF SEARCH HISTORY

First Hit Fwd Refs

Generate Collection Print

L3: Entry 14 of 17 File: USPT Jan 20, 1998

DOCUMENT-IDENTIFIER: US 5709757 A
TITLE: Film forming and dry cleaning apparatus and method

Drawing Description Text (4):
FIG. 2 is a cross-sectional view schematically showing the structure of a one-by-one type lamp-heating CVD apparatus according to a second embodiment of the invention;

Detailed Description Text (18):
The CVD apparatus can be evacuated to a predetermined low pressure level. The CVD apparatus has a substantially cylindrical process chamber 2 for subjecting an object to be processed, for example, a semiconductor wafer W, to a film forming process. A side wall 2a of the process chamber 2 is formed of, for example, aluminum, and a heater 26a is embedded in the side wall 2a. Therefore, the side wall 2a can be heated from room temperature to a desired temperature, for example, 250.degree. C., at the time of the film forming process or at the time of cleaning (described later).

Detailed Description Text (33):
The heater 26c comprises an insulator 26d and a strip-like heating element 26e embedded in the insulator 26d. The heating element 26e has a predetermined pattern, for example, a spiral pattern. A voltage is applied to the heating element 26e from an AC power supply (not shown) provided outside the process chamber 2. Thus, the heater 26c is heated up to a predetermined temperature, for example, 400.degree. C. to 2000.degree. C., and the object W on the table 25 can be kept at a predetermined temperature, for example, 800.degree. C.

Detailed Description Text (78):
The embodiment of the cleaning method of the present invention, which is applied to the one-by-one type resistance-heating CVD apparatus 1 shown in FIG. 1, has been described. The present invention is applicable not only to the resistance-heating CVD apparatus but also to a one-by-one type lamp-heating CVD apparatus as described below.

Detailed Description Text (80):
A second embodiment of the present invention as applied to a lamp-heating CVD apparatus will now be described with reference to FIG. 2.

Detailed Description Text (81):
The lamp-heating CVD apparatus has a hermetically constructed process chamber 102 for subjecting an object to be processed, for example, a wafer W, to a film forming process. A process gas supply pipe 131 is connected to a top

portion of the process chamber 102. The process gas supply pipe 131 is connected via a mass flow controller (MFC) 110 and a valve V' to a film forming process gas source 108, a dry cleaning gas source 109a, a nitrogen gas source 109b, an inert gas source 109c and an IPA gas source 109d. Thus, a predetermined gas can be supplied in accordance with the type of process, for example, film formation or cleaning.

Detailed Description Text (91):
A transmissive window 161 formed of, for example, quartz is attached to the bottom of the process chamber 102. A heating chamber 162 is provided on the bottom side of the process chamber 102 with the transmissive window 161 interposed. In the heating chamber 162, a plurality of heating lamps 163 for heating the wafer are fixed at predetermined positions on upper and lower rotational plates 164 and 165. The two rotational plates 164 and 165 are coupled to a rotating mechanism 167 by means of a rotational shaft 166. A side portion of the heating chamber 162 is provided with a cooling air introducing port 168 for introducing cooling air, thereby to prevent the heating of the inside of the process chamber 102 and the transmissive window 161.

Detailed Description Text (92):
Although not shown, this lamp-heating CVD apparatus is connected via a valve to a hermetically sealed load lock chamber situated near the CVD apparatus.

Detailed Description Text (93):
A description will now be given of the film forming process using the one-by-one type lamp heating CVD apparatus having the above structure and the dry washing process performed within the process chamber.

Detailed Description Text (95):
Then the heating lamps 163 are turned on to heat the wafer up to, for example, 350.degree. to 500.degree. C. While the process chamber 102 is being evacuated by a vacuum pump (not shown) via the exhaust port 123, a predetermined process gas, for example, a mixture gas of titanium tetrachloride+an inert gas or a mixture gas of titanium tetrachloride+ammonia, is supplied into the process chamber 102 from the gas introducing chamber 132 via the process gas supply pipe 131 at a flow rate of 10 to 200 sccm, and the process chamber 102 is maintained at a predetermined pressure. The process gas is decomposed by heat of the wafer and titanium, for example, is produced. Thus, a titanium film or a titanium nitride film is deposited on the surface of the wafer.

Detailed Description Text (114):
As has been described above in connection with the first embodiment, since sufficient effects can be obtained at room temperature with the first and second cleaning methods, there is no need to heat the part to be cleaned, unlike the prior art. However, needless to say, the parts to be cleaned, for example, the gas introducing chamber 132, inner walls 121, 121a and 121b of the process chamber 102, or transmissive window 161, may be heated, if necessary, up to a proper temperature, for example, 50.degree. to 250.degree. C. by means of the heaters 122, 126 and 134 or heating lamps 163, thereby to shorten the cleaning time.

Detailed Description Text (116):

In the above embodiments, the invention has been applied to the one-by-one type resistant-heating CVD apparatus and one-by-one type lamp-heating CVD apparatus. The invention, however, is applicable to a batch-type CVD apparatus will be described below. Since it is difficult to perform plasma cleaning in the batch-type CVD apparatus, the invention can advantageously be applied to this type of CVD apparatus.

Detailed Description Text (119):
FIG. 3 is a cross-sectional view showing a high-speed vertical heat treatment furnace used as a low-pressure CVD apparatus. This vertical heat treatment furnace comprises a horizontal base 210, a substantially cylindrical heat-insulating furnace body 211 provided with a closed top portion and supported vertically on the base 210, a reaction tube 212 inserted in the furnace body 211 with a predetermined gap between the tube 212 and the inner wall of the furnace body 211, and a heater 213 formed of a resistance heating element embedded spirally in the furnace body 211 so as to surround the reaction tube 212. The reaction tube 212 has a substantially cylindrical shape with a closed top portion and is formed of, for example, quartz or fused silica.

Detailed Description Text (163):
As has been described above, the first vacuum process apparatus 302A is designed to form, for example, a titanium layer or a titanium nitride film as a metal film or a metal nitride film by CVD. The first vacuum process apparatus 302A is, for example, a lamp-heating CVD apparatus as shown in FIG. 2. A description of the details of the apparatus is omitted since the apparatus has already been described with reference to FIG. 2.

Detailed Description Text (173):
Heaters (not shown) are embedded in the walls defining each chamber and the first and second transfer arms 316 and 320 within the first and second transfer chambers 308 and 304. Thereby, the parts to be cleaned can be heated up to a predetermined temperature, for example, 50.degree. C. to 120.degree. C. at the time of cleaning.

Current US Cross Reference Classification (2):
134/1.1

Current US Cross Reference Classification (6):
438/905

CLAIMS:

9. The apparatus according to claim 7, wherein said heating means includes a heating lamp.

23. The apparatus according to claim 21, wherein said heating means includes a heating lamp.

47. The apparatus according to claim 45, wherein said heater includes a heating lamp.

62. The apparatus according to claim 60, wherein said heater includes a heating lamp.